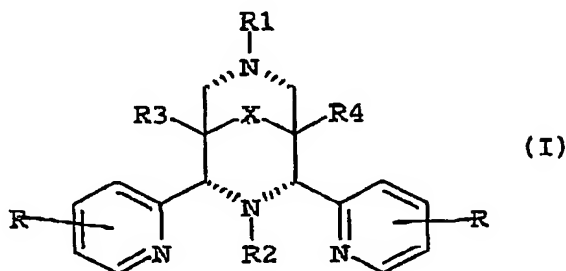


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transition metal catalyst comprising: i) a transition metal;  
ii) a ligand having formula (I):



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wherein each R is independently hydrogen, hydroxyl, C1-C4 alkyl, and mixtures thereof; R1 is C1-C4 alkyl, C6-C10 aryl, and mixtures thereof; R2 is C1-C4 alkyl, C6-C10 aryl, and mixtures thereof; R3 and R4 are each independently hydrogen,

10 C1-C8 alkyl, C1-C8 hydroxyalkyl,  $-(CH_2)_xCO_2R_5$  wherein R5 is C1-C4 alkyl, x is from 0 to 4, and mixtures thereof; X is carbonyl,  $-C(R_6)_2-$  wherein each R6 is independently

hydrogen,

hydroxyl, C1-C4 alkyl, and mixtures thereof; b) optionally a

15 source of hydrogen peroxide; and c) the balance carriers and adjunct ingredients. However, the teaching of WO0060045 limits substituents at the nitrogens (3 and 7 positions) of bicyclostructure to homoaromatic carbon groups, namely alkyl and aryl.

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WO0248301, to Unilever, in contrast to WO0060045 discloses compounds having a similar core structure but with the requirement that at least one of R1 and R2 is a group containing a heteroatom capable of coordinating to a

25 transition metal.

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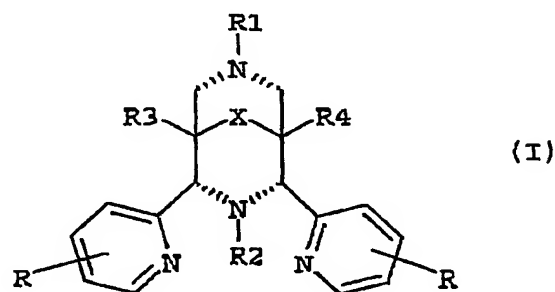
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We claim:

1. A bleaching composition comprising:

- 5 a) a monomer ligand, L, or transition metal catalyst thereof of a ligand having the formula (I):



- 10 wherein R1 and R2 may be selected from the group consisting of:

a group containing a heteroatom capable of coordinating to a transition metal;

a -C1-C22-optionally substituted-alkyl;

- 15 a -C6-C10-aryl;

a -C1-C4-alkyl-C6-C10-aryl; and,

wherein at least one of R1 and R2 is a non-aromatic

hydrocarbon group, the non-aromatic hydrocarbon group being

- 20 a C8-C22-alkyl chain;

R3 and R4 are same and selected from the group consisting

of: -C(O)O-C1-C24-alkyl, -C(O)-O-C1-C24-aryl -CH2OC(O)C1-

C20-alkyl, benzyl ester, phenyl, benzyl, CN, hydrogen,

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methyl, and C1-C4-OR wherein R is selected from the group consisting of H, C1-C24-alkyl or C(O)-C1-C24-alkyl;

X is C=O;

5

R is -C0-C4-alkyl; and,

b) the balance carriers and adjunct ingredients.

- 10 2. A bleaching composition according to claim 1, wherein the group containing a heteroatom capable of coordinating to a transition metal is selected from the group consisting of: an optionally substituted tertiary amine of the form -C2-C4-alkyl-NR7R8, in which R7 and R8 are independently selected
- 15 from the group consisting of straight chain, branched or cyclo C1-C12 alkyl, benzyl, the -C2-C4-alkyl- of the -C2-C4-alkyl-NR7R8 may be substituted by 1 to 4 C1-C2-alkyl, or may form part of a C3 to C6 alkyl ring, and in which R7 and R8 may together form a saturated ring containing one or more
- 20 other heteroatoms;  
a heterocycloalkyl: selected from the group consisting of: pyrrolinyl, pyrrolidinyl, morpholinyl, piperidinyl, piperazinyl, hexamethylene imine, 1,4-piperazinyl, tetrahydrothiophenyl, tetrahydrofuranyl, tetrahydropyranyl,
- 25 and oxazolidinyl, wherein the heterocycloalkyl may be connected to the ligand via any atom in the ring of the selected heterocycloalkyl;  
a -C1-C6-alkyl-heterocycloalkyl, wherein the heterocycloalkyl of the -C1-C6-alkyl-heterocycloalkyl is
- 30 selected from the group consisting of: piperidinyl, piperidine, 1,4-piperazine, tetrahydrothiophene,

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tetrahydrofuran, pyrrolidine, and tetrahydropyran, wherein the heterocycloalkyl may be connected to the -C1-C6-alkyl via any atom in the ring of the selected heterocycloalkyl; and,

- 5 a -C1-C6-alkyl-heteroaryl, wherein the heteroaryl of the -C1-C6-alkyl-heteroaryl is selected from the group consisting of: pyridinyl, pyrimidinyl, pyrazinyl, triazolyl, pyridazinyl, 1,3,5-triazinyl, quinolinyl, isoquinolinyl, quinoxalinyl, imidazolyl, pyrazolyl, benzimidazolyl,
- 10 thiazolyl, oxazolidinyl, pyrrolyl, carbazolyl, indolyl, and isoindolyl, wherein the heteroaryl may be connected to the -C1-C6-alkyl via any atom in the ring of the selected heteroaryl and the selected heteroaryl is optionally substituted by a group selected from the group consisting of
- 15 a -C1-C4-alkyl, -C0-C6-alkyl-phenol, -C0-C6-alkyl-thiophenol, -C2-C4-alkyl-thiol, -C2-C4-alkyl-thioether, -C2-C4-alkyl-alcohol, -C2-C4-alkyl-amine, and a -C2-C4-alkyl-carboxylate.

- 20 3. A bleaching composition according to claim 1, wherein at least one of R1 and R2 is a non-aromatic hydrocarbon group, the non-aromatic hydrocarbon group being a C10-C20 alkyl chain.

- 25 4. A bleaching composition according to claim 1, wherein one of R1 and R2 is selected from the group consisting of: Me, CH2-C6H5, and pyridin-2-ylmethyl, wherein the pyridin-2-ylmethyl is optionally substituted by C1-C4-alkyl.

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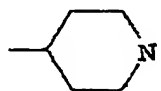
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5. A bleaching composition according to claim 1, wherein one of R1 and R2 is selected from the group consisting of: an optionally substituted tertiary amine of the form -C2-C4-alkyl-NR7R8, in which R7 and R8 are independently selected from the group consisting of straight chain, branched or cyclo C1-C12 alkyl, -CH2-C6H5, wherein the C6H5 is optionally substituted by -C1-C4-alkyl or -O-C1-C4-alkyl, and pyridin-2-ylmethyl wherein the pyridine is optionally substituted by C1-C4-alkyl, the -C2-C4-alkyl- of the -C2-C4-alkyl-NR7R8 may be substituted by 1 to 4 C1-C2-alkyl, or may form part of a C3 to C6 alkyl ring, and in which R7 and R8 may together form a saturated ring containing one or more other heteroatoms.

6. A bleaching composition according to according to claim 5, wherein the optionally substituted tertiary amine of the form -C3-alkyl-NR7R8.

7. A bleaching composition according to according to claim

5, wherein the -C3-alkyl-NR7R8 is



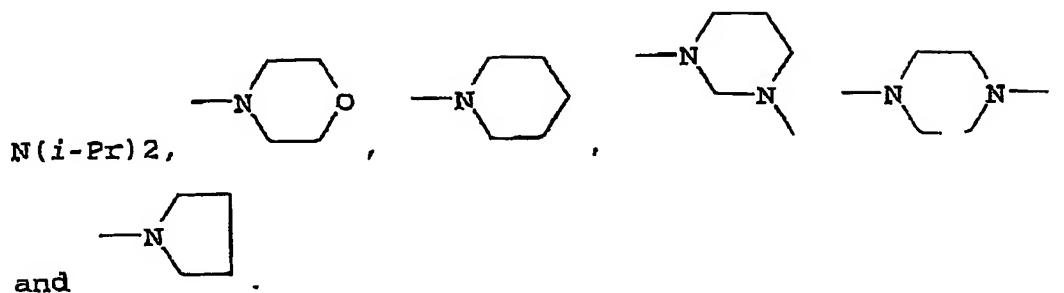
8. A bleaching composition according to according to claim 6, wherein the optionally substituted tertiary amine of the form -C2-alkyl-NR7R8.

9. A bleaching composition according to claim 6, wherein -NR7R8 is selected from group consisting of: -NMe2, -NEt2, -

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5 10. A bleaching composition according to claim 1, wherein R3 and R4 are selected from the group consisting of -CH<sub>2</sub>OH, -C(O)-O-CH<sub>2</sub>C<sub>6</sub>H<sub>5</sub> and -C(O)O-C<sub>1</sub>-C<sub>6</sub>-alkyl.

10 11. A bleaching composition according to claim 10, wherein R3 and R4 are selected from the group consisting of: -C(O)-O-CH<sub>3</sub>, -C(O)-O-CH<sub>2</sub>CH<sub>3</sub>, -C(O)-O-CH<sub>2</sub>C<sub>6</sub>H<sub>5</sub> and CH<sub>2</sub>OH.

12. A bleaching composition according to claim 1, wherein the complex is of the general formula (A1):

15



in which:

20 M represents a metal selected from Mn(II)-(III)-(IV)-(V), Cu(I)-(II)-(III), Fe(II)-(III)-(IV)-(V), Co(I)-(II)-(III), Ti(II)-(III)-(IV), V(II)-(III)-(IV)-(V), Mo(II)-(III)-(IV)-(V)-(VI) and W(IV)-(V)-(VI);

25 X represents a coordinating species selected from any mono, bi or tri charged anions and any neutral molecules able to coordinate the metal in a mono, bi or tridentate manner;

Y represents any non-coordinated counter ion;

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a represents an integer from 1 to 10;

k represents an integer from 1 to 10;

n represents an integer from 0 to 10;

m represents zero or an integer from 1 to 20; and

5 L represents a ligand as defined in claims 1 to 19, or its protonated or deprotonated analogue.

13. A bleaching composition according to claim 12, wherein M represents a metal selected from Fe(II)-(III)-(IV)-(V).

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14. A bleaching composition according to claim 13, wherein M represents a metal selected from Fe(II) and Fe(III).

15. A bleaching composition according to claim 14, wherein the ligand is present in the form selected from the group consisting of [FeLCl]Cl ; [FeL(H<sub>2</sub>O)](PF<sub>6</sub>)<sub>2</sub>; [FeLCl]PF<sub>6</sub> and [FeL(H<sub>2</sub>O)](BF<sub>4</sub>)<sub>2</sub>.

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